



## 2. Alternatives

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### 2.1 Introduction

Chapter 1 described the joint lead agencies’ purposes and needs for the proposed action. This chapter provides a brief description of the full range of alternatives considered in developing the proposed Cedar River Watershed Habitat Conservation Plan (HCP), in support of the Incidental Take Permit (ITP) application. This range of alternatives includes the Proposed HCP Alternative and the “no action” alternatives as required under both the National Environmental Policy Act (NEPA) and the State Environmental Policy Act (SEPA). Where appropriate, additional alternatives are also evaluated in detail. Other alternatives suggested for the HCP are identified with explanations as to why these suggestions did not receive further consideration.

This chapter is structured to present succinctly all of the alternatives for the proposed HCP. Section 2.2 describes how the range of alternatives was developed and identifies the HCP proposal and provides definitions for the “no action” and additional alternatives. This section also discusses the criteria used for screening alternatives.

Section 2.3 describes the alternatives for the Watershed Management, Anadromous Fish Mitigation, and Instream Flow components of the HCP. The discussion for each component describes the alternatives starting with the No Action Alternative, followed by the proposed action. Where appropriate, additional alternatives are discussed. A table comparing the characteristics of each of the alternatives is also provided for each component. The descriptions of alternatives for each component are followed by an explanation of why other alternatives suggested for the proposed action were not considered reasonable and, therefore, were not fully evaluated as part of this Environmental Assessment/Final Environmental Impact Statement (EA/FEIS). Each section then discusses the full range of alternatives appropriate for decision-making purposes. The discussion of alternatives for each component concludes with an identification of the environmental consequences to be considered for each element of the affected environment.

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## 2.2 Development of Alternatives

The full range of alternatives considered for the proposed HCP was developed over 4 years with input from a wide variety of parties. For example, numerous ideas concerning each aspect of the management programs were generated during the negotiations with state, federal, and tribal agencies that led to the HCP proposal outlined in *Agreement In Principle for the Cedar River Watershed Habitat Conservation Plan* (AIP) (City of Seattle, 1997). As previously discussed, the Applicant has also conducted an intensive public outreach program during development of the HCP proposal. These outreach efforts included numerous public presentations and direct meetings with local public interest groups concerned with environmental, fisheries, and water supply issues. During these interactions, different ideas were often discussed with City staff and considered or incorporated into the proposal. The scoping process conducted during the spring and summer of 1997 provided the public with an opportunity to formally suggest alternatives to the proposed actions. All of these suggestions, whether provided through oral testimony or written comments, are documented in the *Cedar River Watershed Habitat Conservation Plan EA/EIS Scoping Report* (Seattle Public Utilities, 1997a).

### 2.2.1 Proposed HCP Alternative

The Applicant's proposed action is detailed comprehensively in the *Public Review Draft of the Cedar River Watershed Habitat Conservation Plan* (City of Seattle, 1998). Brief summaries of the main features of each component of the HCP are described in later sections of this chapter. These features are intended to serve as the basis of comparison between the No Action Alternatives and other reasonable alternatives fully evaluated in this EA/EIS. All of the elements of the Proposed HCP Alternative are intended to function together as a comprehensive conservation strategy providing net benefits for species of concern in the Watershed.

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### 2.2.2 No Action Alternative

NEPA, SEPA, and Chapter 25.05 of the Seattle Municipal Code all require discussion of a "no action" alternative. Because the Applicant's proposed action is discretionary, the Applicant needs to define what is likely to occur if the action is not taken. In this case, the No Action Alternative is defined as non-issuance of an ITP without implementation of the proposed HCP. For the purposes of this EA/EIS, the No Action Alternative is defined as no change from current management direction or level of management intensity. The No Action Alternative describes the current and likely future management of land activities, water supply operations, and the generation of hydroelectric power related to the species of concern without an ITP and without an HCP.

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### 2.2.3 Reasonable Alternatives

NEPA characterizes reasonable alternatives as those that are practical or feasible from technical and economic standpoints using common sense. Under SEPA, the Washington Administrative Code (WAC 197-11-786) refines this characterization of reasonable alternatives as actions that could “feasibly attain or approximate a proposal’s objectives, but at a lower environmental cost or decreased level of environmental degradation. Reasonable alternatives may be those over which an agency with jurisdiction has authority to control impacts, either directly or indirectly through requirement of mitigation measures.” Under both NEPA and SEPA, the concept of reasonable alternatives is intended to limit the overall number and range of alternatives, as well as the amount of detailed analysis required for each alternative. When there are potentially numerous alternatives, as is the case with this proposed HCP, a reasonable number of examples covering the full spectrum of alternatives must be analyzed and compared in the EA/FEIS.

Potential conflicts with local, state, or federal laws do not necessarily render an alternative unreasonable. However, in these cases such conflicts must be considered.

#### Criteria Used to Determine Reasonable Alternatives

The range of reasonable alternatives appropriate for analysis is constrained by the set of planning objectives explained in detail in Section 1.2 of this report. Alternatives must be in compliance with the ESA and also minimize disruption in the management of the region’s water, fisheries, wildlife, and hydroelectric power resource. As discussed earlier, a set of alternatives was suggested for consideration through a variety of processes. Only those alternatives that meet the purposes, needs and objectives discussed in Chapter 1 are analyzed in detail in this document. An alternative would not be considered reasonable if it fails to achieve the stated planning objectives of the Applicant.

In evaluating the alternatives, the lead agencies determined which alternatives were completely outside the scope of the proposal. Alternatives determined to be undefined, remote, or speculative have been excluded from further analysis. These types of alternatives include those that do not meet ESA requirements or would impair utility operations in the Cedar River Municipal Watershed.

Next, the agencies grouped the alternatives which represented relatively small variations on one overall mitigation approach. As an example, one of the alternatives for the Anadromous Fish Mitigation component is based on the general concept of delaying construction of the proposed sockeye hatchery until more data have been collected on the effectiveness of the interim sockeye facility and other concerns, such as the carrying capacity of Lake Washington. Different management strategies within this alternative involve the timing of when a permanent facility may be constructed, as well as when and how much

downstream habitat restoration work may be completed prior to hatchery construction.

All alternatives suggested for consideration, but eliminated from detailed analysis for specific reasons, are explained in the following sections for each component of the plan.

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## 2.3 Alternatives Considered

This section describes all the alternatives considered for each component of the proposed HCP, including Watershed Management, Anadromous Fish Mitigation, and Instream Flows. The discussion for each component is organized by a general description of the following:

- a description of alternatives considered in detail
- the decision-making space intended to be covered by this range of alternatives
- the No Action Alternative
- the Proposed HCP Alternative
- any other reasonable alternatives
- alternatives considered but eliminated from detailed analysis.
- a list of environmental consequences

Please note that for the sake of clarity a special section in the HCP is devoted to “Research and Monitoring” (Section 4.5 of the Draft HCP). All of the research and monitoring proposals in this section of the HCP relate to specific aspects of each component of the plan. Unless otherwise noted, the reader should assume that all relevant research and monitoring proposals apply to each reasonable alternative fully evaluated in addition to the Proposed HCP Alternative.

### 2.3.1 Watershed Management Alternatives (WM)

#### Description of Alternatives Evaluated In Detail

Five alternatives are evaluated in detail for the Watershed Management (WM) component of the HCP. These include the No Action Alternative and the Proposed HCP Alternative, and three identified reasonable alternatives for Watershed Management. These alternatives include (1) long-term sustainable thinning, (2) a thinning alternative with phased out commercial harvest, and (3) a no commercial timber harvest alternative, establishing a 100 percent Reserve. Map 12 of the Resource Map document for the EA/FEIS displays a composite of all of the Reserve alternatives. The main differences between all five Watershed Management alternatives relate to the size of the proposed Ecological Reserve and the constraints imposed on the commercial harvest of

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timber from non-Reserve lands, also called matrix lands. For example, the No Action Alternative includes a proposed Reserve covering just over 58 percent of the land base of the Watershed. The Reserve area for the Proposed HCP Alternative builds upon this preliminary Reserve design, as do the other reasonable alternatives. Unless explicitly stated, all other attributes of the three reasonable alternatives are the same as the Proposed HCP Alternative.

### **No Action Alternative for Watershed Management (WM-1)**

The No Action proposal represents what is likely to occur in management of the Cedar River Municipal Watershed if the Applicant does not pursue an ITP and does not implement an approved HCP. The No Action Alternative for Watershed Management (WM-1) is defined as no change from current management direction or level of management intensity. Under this alternative, it is assumed that the Applicant would continue with implementation of the Secondary Use Objectives adopted for the Watershed, as part of City of Seattle Ordinance #114632 (see Section 2.3.11 of the Draft HCP for more detail).

This implementation would continue the current policy of reserving from harvest 51,657 acres or just over 58 percent of the land base of the Watershed (see Map 13).

The design of the no action Reserve focused on protecting water quality and maximizing habitat benefits to the species of concern within the size limit discussed. Elements of the design include:

- all existing old-growth forest habitat with 200-foot buffers
- all streams with buffers ranging in size from 100 to 300 feet depending on stream type
- 300-foot no-cut buffers on all lakes, ponds, and open water bodies
- all wetlands with buffers ranging from 100 to 300 feet depending on wetland size and type (see glossary for definition of “wetlands”)
- all known riparian habitat
- all inner gorges, selected sensitive soils, and headwall basins
- special habitat areas, including talus/felsenmeer slopes, known cliff and cave habitats, meadow complexes, and upland shrub habitats
- Taylor cultural resource area
- Rattlesnake Lake watershed
- wetland and aquatic complexes (Walsh Lake area and Rex River headwaters).
- additional areas for bull trout protection.
- providing long-term protection for existing low-elevation, second-growth forests that provide mature forest structure.

Commercial timber harvesting could take place under the No Action Alternative on non-reserve lands (matrix lands) pursuant to the minimum Washington State Forest Practices Act regulations. Current Washington regulations allow clearcuts up to 120 acres in size. Green tree retention requirements for clearcut harvest units include three wildlife Reserve trees, two green recruitment trees, and two downed logs for each acre harvested. Wildlife Reserve trees must be greater than or equal to 10 feet in height and 12 inches in diameter at breast height (dbh). Harvest rotation age under the No Action Alternative would range from 40 to 60 years.

In addition to the proposed Ecological Reserve, the No Action Alternative also includes two special management areas (SMAs). The first one of these SMAs includes City lands within a 1-mile circle around Landsburg, an additional 300 feet to be applied to the reservoir buffer, and all Type I streams downstream of the Masonry Dam. The purpose of this area is to provide additional protection for water quality by limiting timber harvesting to specific thinning applications designed to avoid excessive buildup of mammal populations that can be sources of human pathogens. The second SMA includes lands around Carey Creek to minimize the potential for erosion and sedimentation to this anadromous-fish-bearing stream.

It is possible that watershed analysis as prescribed under the State Forest Practices Act (Chapter 222 WAC) could be implemented sometime in the future as part of the No Action Alternative, but the City currently has no plans to initiate this process. Because of the large Reserve area already in place under the No Action Alternative, estimating the implementation of any future watershed analysis prescriptions would be speculative at best. As a result of these uncertainties, watershed analysis has not been included as part of the evaluation for the No Action Alternative. Ecological thinning and restoration thinning within the Reserve would not take place as part of this alternative.

The No Action Alternative assumes that the current level of funding would be provided for road maintenance, stabilization, and decommissioning. Priorities concerning road work would continue to be based on water quality, road access, and safety needs. Considerations for fisheries and wildlife would be secondary to these needs. Additional stream riparian or upland habitat restoration projects would not be implemented as part of this alternative.

### **Proposed HCP Alternative for Watershed Management (WM-2)**

This alternative is represented by the proposed action presented in detail in Chapter 4 of the Applicant's *Draft Cedar River Watershed Habitat Conservation Plan* (City of Seattle, 1998). This section describes the most significant differences between the proposed action from the other alternatives discussed.

The Ecological Reserve for the Proposed HCP Alternative covers approximately 56,223 acres or just under 64 percent of the land base of the Watershed and is shown in Map 15. This Reserve area builds upon the preliminary Reserve design established for the No Action Alternative. An additional 4,596 acres are added to the design to (1) provide additional habitat diversity and connectivity across the landscape; (2) “block up” existing old growth habitat; and (3) block up headwaters of Hotel, Rock, and Williams Creeks (see Map 16) for a depiction of the elements contained in the Ecological Reserve for the proposed action). The Reserve includes 65 percent of lands owned by the Applicant in 1989 (the maximum authorized under the Secondary Use Ordinance) plus the deed-restricted lands received as part of the land exchange with the U.S. Forest Service.

In addition to the proposed Ecological Reserve, the Proposed HCP Alternative also includes the same SMAs described above for the No Action Alternative.

Timber harvesting for commercial purposes would be limited to non-Reserve lands (matrix lands) and would be conducted at standards that exceed the minimum protection levels provided by Washington State Forest Practices Act regulations. Non-Reserve lands (matrix lands) under the Proposed HCP Alternative would amount to approximately 32,100 acres or 36 percent of the land base of the Watershed. Under the Proposed HCP Alternative, timber harvesting for commercial purposes would be structured to create an uneven stand age distribution across the landscape that would allow the Applicant to transition to a long-term sustainable forest management program based on a harvest rotation age of 120 to 140 years. The Applicant would adopt a set of forest management guidelines that would include green tree retention standards resulting in an average retention of approximately 20 percent of the stand volume. Retention standards would include four wildlife Reserve trees, four dominant or codominant recruitment trees, and two down logs. The purpose of these higher retention standards would be to promote habitat structure in regenerating forest structure. This harvest method will hereafter be referred to as retention harvest. These cuts would not exceed 120 acres in size.

In addition to these constraints on timber harvesting, the Applicant would commit to implement the set of Watershed Assessment Prescriptions described in the Draft HCP (and reproduced in Technical Appendix 16). One of these prescriptions is the rain-on-snow rule which requires that at least two-thirds of the forest vegetation in the “rain-on-snow” (ROS) and “snow-on-snow” (SOS) zones be maintained in a hydrologically mature condition defined as a minimum canopy closure of 70 percent and an average tree size of 9 inches in diameter at breast height. Other Watershed Assessment Prescriptions provide protections for inner gorges, areas of moderate and high landslide potential, and areas of high surface erosion hazard potentials from silvicultural operations. Please note that inner gorges are included in the ecological reserve. Although commercial timber harvesting will not occur within inner gorge areas, Watershed Assessment Prescriptions have been adopted to

provide protection in the few instances where yarding across inner gorges may occur.

Outside the Reserve, commercial thinnings would be implemented to develop late successional like habitat structure by leaving dominant and codominant (i.e., larger) trees, while removing some of the smaller multilayered stands that would provide structural and species diversity prior to final harvest. Thinnings would be scheduled by stand conditions, rather than age, using crown competition factor (ccf). Thinning levels would maintain crown closure between the level where minimal mortality occurs and the level where mortality exists but growth still exceeds mortality. The extent of thinning would be structured on a site-specific basis to minimize the risk of widespread windthrow of the remaining trees.

In addition to the Ecological Reserve and constraints on commercial timber harvest operations, the Proposed HCP Alternative also contains a detailed set of conservation strategies for streams, riparian areas, upland habitat, and special habitat areas, as well as all of the species of concern listed in the proposed HCP. These strategies include a great deal of restoration work which can be summarized as follows:

- culvert, upgrades, and replacement for fish passage (funding commitments of \$1,220,000 over 50 years)
- culvert upgrades and replacements for sediment reduction (funding commitments of \$850,000 over 50 years)
- a large woody debris placement program for streams (funding commitments of \$975,000 for 50 years)
- stream bank stabilization (funding commitment of \$756,000 for 50 years)
- stream bank revegetation program (funding commitment of \$212,000 over 50 years)
- conifer under-planting and long-term maintenance program (funding commitment of \$212,000 over 50 years)
- restoration thinning in riparian areas (funding commitment of \$180,000 for 50 years)
- pre-commercial thinning to promote habitat development on non-Reserve lands (matrix lands) (funding commitments of \$4,120,000 over 50 years)
- restoration and ecological thinning on Reserve lands (funding commitments of \$2,000,000 over 50 years)
- restoration planting in the Ecological Reserve (funding commitments of \$300,000 over 50 years)
- road abandonment and stabilization projects (funding commitments of \$7,250,000 over 50 years)



- road maintenance for the protection of water quality and fisheries resources (funding commitments of \$3,218,000 over 50 years).

These habitat restoration and enhancement projects, along with the proposed Reserve and constraints on timber harvesting, are intended to function together as a comprehensive conservation strategy providing net benefits for the species of concern in the Watershed. Commercial harvest of timber would be conducted to improve growing conditions, promote understory initiation, and potentially improve overall habitat conditions. Approximately 10 miles of new road construction would be needed for this alternative for silvicultural proposes and emergency access, but overall net road miles would be reduced through decommissioning.

### **Long-term Sustainable Thinning Alternative (WM-3)**

The purpose of the long-term sustainable thinning alternative is to illustrate the differences that would occur if the commercial harvest of timber from non-Reserve lands (matrix lands) were limited to thinning applications. Instead of the retention cuts in the Proposed HCP Alternative, WM-2, the commercial harvest of timber would be allowed only on stands selected for multiple-entry thinning based on site-specific stand characteristics to potentially improve overall habitat conditions on non-reserve lands (matrix lands) and minimize the potential for blow down and other risks.

Except for the way timber harvesting would be managed, all other elements of this alternative would be the same as for the Proposed HCP Alternative. For example, the Ecological Reserve, covering 64 percent of the land base, is the same for this alternative as in the Proposed HCP Alternative (Map 18). The same guidelines for the SMAs would apply. In addition, all of the conservation strategies developed for streams, riparian areas, upland habitat, special habitat areas, and species-specific strategies under the Proposed HCP Alternative are the same for the long-term sustainable thinning alternative. New road construction would be limited to short spur roads required to establish landings for access to thin harvest units. Full evaluation of this alternative should indicate whether or not there are any differences in potential timber revenues or environmental impacts from the multiple entry thinning compared to the way retention cuts are managed under the Proposed HCP Alternative, WM-2.

An important aspect of this alternative is the way commercial thinning would be conducted on non-Reserve lands (matrix lands). First of all, thinning would only occur in timber stands where a minimum of 5,000 board feet per acre could be removed while still meeting the goal of maintaining the CCF above 300. At this level, some mortality will occur, but growth within the stand still exceeds this mortality. These selective commercial thinnings would, if authorized by the City Council, be scheduled throughout the 50-year timeline of the HCP on an even flow and sustained yield of timber. Thinnings would

leave the dominant and codominant (larger) trees, while removing some of the smaller and less vigorous trees. Thinnings would be designed to develop multilayered stands that would provide some degree of structure and species diversity. Stand conditions rather than stand age would determine which stands would be selected for thinning treatments. The extent of thinning would not exceed levels known to result in widespread blowdown of the remaining trees. There would be no final harvest under this alternative, and consequently there is no maximum limit on the commercial thinning harvest unit size.

Where applicable, all of the same forest management guidelines (constraints) and Watershed Assessment Prescriptions developed for the Proposed HCP Alternative hold for this alternative. The only minor exception is the rain-on-snow rule. During the development of the Watershed Assessment Prescriptions, a review of the literature did not provide any scientific evidence that thinning in ROS and SOS zones could cause the same type of precipitation events associated with clearcutting in these areas. Although the ROS constraint would prohibit thinning in subbasins which currently meet the rule, thinning as proposed would not affect the hydrologic maturity of forest vegetation in the ROS and SOS zones in other basins. As a result, the rule is viewed as not relevant for these areas.

### **Thinning Alternative With Phased Out Commercial Timber Harvest (WM-4)**

The main intent of this alternative is to evaluate a program that would generate timber revenues from a thinning only approach, eventually phasing out the commercial harvest of timber in the Cedar River Municipal Watershed. Potential revenues under the alternative would be capped at the cost of implementing the proposed HCP. Alternative WM-4 has been designed to allow thinning over the full 50 years of the proposed HCP. This variation has been chosen for detailed analysis to compare the impacts of the thinning approach in this alternative to alternatives WM-2 and WM-3.

This alternative differs from the previous alternative in four main ways: (1) the Ecological Reserve for this alternative starts off approximately 3,795 acres larger than the Reserve area established for the Proposed HCP Alternative and alternative WM-3 (Map 20); (2) although thinning is the only silvicultural method which could be used to extract timber from non-Reserve lands (matrix lands) under this proposal, thinnings would be scheduled primarily by stand age and size class within designated zones with different rates of harvest volume removal (no consideration was given to blow down potential; (3) as these designated zones are thinned, they would be added to the Reserve system so that the commercial harvest of timber could be completely phased out in the Cedar River Municipal Watershed; and (4) all other elements of the Proposed HCP Alternative and Alternative WM-3 are the same for this alternative, including approximately 10 miles of new road construction.

Map 20 shows the Reserve system for this alternative. As previously mentioned, the initial Ecological Reserve would be approximately 3,795 acres larger than the Ecological Reserve in the Proposed HCP Alternative. Most of this area is characteristic of lower elevation pole-young and mature forest habitat found in the lower municipal watershed. This initial Reserve would cover 60,019 acres or approximately 68 percent of the land base of the Watershed. The remainder of the Watershed is broken up into zones where thinning would occur. Zone A covers approximately 2,320 acres within which thinning would only occur during the first 5 years of HCP implementation. A maximum of 15 percent of the timber volume would be allowed to be removed from merchantable stands whose quadratic mean dbh is less than 21 inches. Zone B covers approximately 4,008 acres. Thinning in this zone would only take place during the first 10 years of HCP implementation. A maximum of 25 percent of the timber volume would be allowed to be removed from this zone. Zone C covers approximately 9,531 acres of the Watershed. Thinning in this zone would be allowed during the first 20 years of HCP implementation. A maximum of 50 percent of the timber volume could be removed from merchantable stands with a quadratic mean dbh is less than 21 inches. Zone D covers the remaining 12,286 acres of the Watershed and would be open to thinning throughout the 50-year life of the HCP. A maximum of 65 percent of the timber volume could be removed from merchantable stands whose quadratic mean dbh is less than 21 inches.

As different zones were added to the Reserve system, commercial harvesting of timber would be phased out by the end of 50 years. As a result, there is no attempt as part of this alternative to produce sustainable, even-flow timber volumes. As discussed above, non-reserve lands (matrix lands) are divided into four zones with corresponding periods when each zone is available for thinning to generate revenue. Similar to alternative WM-3, all stands must be capable of producing at least 5,000 board feet/acre to be eligible for thinning. In addition, the quadratic mean diameter of the stands must be less than 21 inches to be eligible for thinning. No trees greater than 24 inches dbh would be harvested for commercial purposes. The constraints applied in this alternative preclude the establishment of retention levels and managed sustained growth projections over time. Because there is no final harvest unit this alternative, there is no maximum limit on the harvest unit size for commercial thinning. Rotation ages are not applicable because timber stands are never cut with the intent to regenerate the entire stand for future commercial harvest.

In general, the main intent of this alternative is to design a program that would generate timber revenues from thinning, eventually phasing out commercial logging in the Cedar River Municipal Watershed. Different thinning applications or approaches could have the potential to generate different timber revenues over time. The approach described here is just one method that would rely on thinning to generate revenues until the commercial harvest of timber is phased out. Although input from local environmental groups was

used in the design of this approach, variations are possible. Variations could include changing the amount of land available for thinning, the amount of volume that could be removed from available stands, the criteria used to identify stands ready for thinning, or how quickly commercial harvesting would be phased out. For example, another option could be to start off with an initial Reserve area that (1) includes Zone A and covers approximately 70 percent of the land base, (2) allows thinning of up to 30 percent of the volume in Zones B and C for 5 years, (3) allows thinning of up to 35 percent of the volume in Zone D for 10 years, and (4) phases out commercial harvesting at the end of the first decade of HCP implementation. Obviously, different options will provide tradeoffs between different levels of environmental protection and the potential for generating timber revenues. No matter what type of thinning takes place, this alternative is not intended to produce more money than it would take to pay for the proposed HCP, even if this type of revenue generation is possible. The Proposed HCP Alternative is currently estimated at more than 70 million dollars over 50 years.

### **No Commercial Timber Harvest Alternative (WM-5)**

Under this alternative, all of the Watershed would be placed immediately into an Ecological Reserve upon adopting the proposed HCP (Map 22). No commercial harvest of timber would take place. All other elements of the Proposed HCP Alternative, including the conservation strategies with proposed habitat restoration and enhancement projects, would also be implemented as part of this proposal. During the first 5 years of plan implementation, a study would be conducted to reevaluate the need for roads in the Watershed, given that no commercial timber harvesting would occur. Although this study would be conducted, funding levels for road decommissioning as part of the HCP would remain the same as in the Proposed HCP Alternative.

### **Watershed Management Alternatives Considered But Eliminated from Detailed Analysis**

No suggested Watershed Management alternatives were eliminated from detailed analysis.

### **Range of Watershed Management Alternatives Considered for Decision-Making Purposes**

A comparison of the five alternatives for the Watershed Management component of the Cedar River Municipal Watershed HCP is shown in Table 2-1. In general, these alternatives describe potential ranges for establishing an Ecological Reserve in the Watershed and for establishing guidelines which would govern any future timber harvest for commercial purposes on non-Reserve lands (matrix lands). At one end of the spectrum, the No Action Alternative would establish an Ecological Reserve covering approximately 58

**Table 2-1. Comparison of Watershed Management Alternatives**

Feature	WM-1 No action	WM-2 Proposed HCP Alternative	WM-3 Long-term thinning	WM-4 Thinning/phase out of commercial harvest	WM-5 No commercial timber harvest
Size of Ecological Reserve (acres/%)	51,657/58%	56,223/64%	56,223/64%	60,019/68%*	88,328/100%
Non-Reserve acres available for commercial timber harvest over 50 years	36,671	32,105	32,105	28,309	0
Special management areas (SMAs)	Yes	Yes	Yes	Yes	DNA**
Type of harvest operations allowed	standard clear cutting and regeneration harvest	retention harvest w/approx. 20% volume retention and multiple entry thinnings	multiple entry thinning	single entry thinning	ecological and restoration thinning only
Sustainable rotation age	40-80 years	transition to 120-140 year rotation	DNA	DNA	DNA
Maximum harvest unit size	120 acres	120 committed for thinning	unlimited	unlimited	DNA
Green tree retention standards	3 wildlife Reserve trees 2 green recruitment trees 2 down logs	4 wildlife trees 4 green recruitment trees (dominant + codominant) 2 down logs	DNA	DNA	DNA
Habitat conservation strategies	No	Yes	Yes	Yes	Yes
Implementation of species specific conservation strategies	No	Yes	Yes	Yes	Yes
Culvert upgrades and replacement for fish passage (\$1,220,000)	No	Yes	Yes	Yes	Yes
Culvert upgrade/ replacement for sediment reduction (\$850,000)	No	Yes	Yes	Yes	Yes
Large woody debris placement in streams (\$975,000)	No	Yes	Yes	Yes	Yes
Streambank armoring for erosion control (\$756,000)	No	Yes	Yes	Yes	Yes
Streambank re-vegetation (\$212,000)	No	Yes	Yes	Yes	Yes

**Table 2-1. Comparison of Watershed Management Alternatives**

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<b>Feature</b>	<b>WM-1 No action</b>	<b>WM-2 HCP Alternative</b>	<b>WM-3 Long-term thinning</b>	<b>WM-4 Thinning/phase out of commercial harvest</b>	<b>WM-5 No commercial timber harvest</b>
Conifer under-planting (\$212,000)	No	Yes	Yes	Yes	Yes
Restoration thinning in riparian areas (\$180,000)	No	Yes	Yes	Yes	Yes
Pre-commercial thinning on non-Reserve lands (matrix lands) to promote habitat development (\$4,120,000)	No	Yes	Yes	Yes	No
Restoration and ecological thinning on Reserve lands (\$2,000,000)	No	Yes	Yes	Yes	Yes
Building of new access roads	No	No	No	No	No
Construction of small spur roads to create landings for harvest units	Yes	Yes	Yes	Yes	No
Monitoring and research programs	No	Yes	Yes	Yes	Yes

\* This Reserve size represents the starting Reserve size at the beginning of HCP implementation.

\*\* DNA = Does not apply because of constraints imposed by this alternative on timber harvesting.

percent of the land base, while the no commercial timber harvesting alternative (WM-5) would place all of the lands in a Reserve system. Constraints on commercial timber harvesting activities vary among the alternatives and include (1) minimum implementation of Washington State Forest Practices Act regulations, (2) application of additional management constraints limiting the degree of retention harvest that could occur under the Proposed HCP Alternative, (3) long-term sustainable multiple entry thinning, (4) short-term single entry thinning, and (5) complete elimination of commercial harvesting all together. The range covered by these alternatives forms boundaries within which decisions regarding the Watershed Management proposal in the Draft HCP can be made.

## **Potential Environmental Consequences of Watershed Management Alternatives**

Potential environmental impacts from these alternatives are discussed in detail in Chapter 4. Environmental consequences assuming the maximum allowable harvest was ultimately pursued include potential impacts from the different

timber harvesting scenarios on elements of the affected environment, including geology and soils, water quality, forest resources, fisheries, wildlife, cultural resources, and socioeconomics. General environmental consequences for geology and soils, water quality, and fisheries center around the potential for each alternative to cause erosion and contribute to the sedimentation of streams in the Watershed. Potential consequences for forest resources and wildlife relate to the amount of timber removed from the Watershed under each alternative and the resulting habitat and stand conditions, such as blowdown potential, that are left behind and develop over time. Consequences for cultural resources involve the potential disruption of unknown cultural resource sites from timber harvesting activities. Consequences for socioeconomics involve the amount of revenue that can be generated from the commercial harvest of timber under the different alternatives and whether or not increases in water rates will be needed to pay for implementation of an HCP.

### **2.3.2 Anadromous Fish Mitigation Alternatives (AFM)**

#### **Description of Alternatives Evaluated in Detail**

This section describes alternatives evaluated in detail to mitigate for any take which may result from the operation of the water intake and the blockage to fish passage caused by the Landsburg Diversion Dam. The No Action Alternative (AFM-1) represents what is likely to occur for anadromous fish if the Applicant does not pursue an ITP and implement the HCP. The Proposed HCP Alternative (AFM-2) lays out a comprehensive mitigation strategy for chinook salmon, coho salmon, sockeye salmon, and steelhead trout. While passage would be provided for chinook, coho, and steelhead past the diversion dam, mitigation for sockeye salmon would be provided by an artificial supplementation program capable of producing 34 million sockeye fry on an annual basis. In addition to the hatchery, the Proposed HCP Alternative would also provide more than \$1.6 million for habitat restoration projects downstream of Landsburg. Differing sockeye hatchery construction considerations and amounts of downstream habitat restoration are the main features that separate the remaining three alternatives (AFM-3, AFM-4, and AFM-5) from the No Action Alternative and the Proposed HCP Alternative. AFM-3 involves the construction of a smaller-scale hatchery operation with the savings going towards additional downstream habitat restoration projects. Under AFM-4, construction of the hatchery would be delayed and dependent upon analysis of information on the effectiveness of current supplementation efforts. In the final alternative (AFM-5), funding originally allocated for the sockeye hatchery in the Proposed HCP Alternative instead would be spent on downstream habitat protection and restoration projects. Over the 50-year life of the proposed HCP, this funding would amount to approximately \$24.1 million, excluding about \$3.7 million for monitoring and research.

Except for the No Action Alternative, all of the alternatives evaluated would provide the same set of mitigation measures for chinook and coho salmon, and

steelhead trout. During the development of the plan, all participants agreed that the provision of safe and effective upstream and downstream fish passage was the only alternative that fully met the objectives set forth in the HCP for minimizing and mitigating the effects of the migration barrier at the Landsburg Dam. No other alternative was recommended for evaluation during the public NEPA/SEPA scoping process for the HCP. Therefore, the four alternatives to the No Action Alternative differ only in the manner in which mitigation is provided for sockeye salmon.

### **No Action Alternative (AFM-1)**

The No Action Alternative represents what is likely to occur if the Applicant does not pursue an ITP and does not implement an approved HCP. In general, the No Action Alternative would be defined as no change from current management, although City Ordinance #115204 directed the Applicant to negotiate a comprehensive solution to the Landsburg blockage with state, federal, and tribal agencies. There is no timeline in place for resolution of these issues. It is assumed that no interim mitigation measures would be implemented for chinook salmon, coho salmon, or steelhead trout until a comprehensive agreement is reached. Funding for the existing interim hatchery, though uncertain, would probably be continued at a cost of \$256,000 per year plus an estimated \$1.8 million for critical improvements (for a total of \$14.6 million over the life of the HCP). No funding for downstream habitat restoration or protection projects would be made available as part of this alternative.

Under the No Action Alternative, the Applicant would respond to the individual listings of species as threatened or endangered on a case-by-case basis. It is uncertain if and when any mitigation would occur for chinook salmon, coho salmon, sockeye salmon, or steelhead trout.

### **Proposed HCP Alternative for Anadromous Fish Mitigation (AFM-2)**

This Proposed HCP Alternative is presented in detail in Chapter 4 of the *Draft Cedar River Watershed Habitat Conservation Plan* (City of Seattle, 1998). This section contains a summary intended to provide enough information to give the reader a fundamental understanding of the proposed alternative.

The Proposed HCP Alternative for Anadromous Fish Mitigation is intended to work hand-in-hand with the Proposed HCP Alternative for Watershed Management. Stream habitat throughout the Lake Washington Watershed has been significantly degraded by human activities during the last century. Productive spawning and rearing habitat is of vital importance for the recovery and persistence of salmonid species. Much productive fish habitat has been lost in the basin, and that which remains is subject to increasing risk from development pressure. The middle Cedar River subbasin (between the Landsburg Dam and the historic anadromous fish barrier at lower Cedar Falls) constitutes some of the best remaining fish habitat in the region. This area and



the entire drainage above it are wholly owned by the City of Seattle and will be managed with extensive Ecological Reserves that will help protect and restore 17 miles of stream into which anadromous fish access will be restored by construction of fish passage facilities.

The mitigation measures of the Proposed HCP Alternative were developed to meet the following set of objectives:

- to implement biologically sound, short- and long-term solutions that help contribute to the recovery and persistence of well-adapted, genetically diverse, healthy, harvestable populations of sockeye, coho, and chinook salmon and steelhead trout in the Cedar River
- to provide fish passage over the Landsburg Diversion Dam, consistent with water quality protection, that is coordinated with run recovery, biological need, water supply operations, and facility maintenance requirements
- to maintain a safe, high-quality drinking water supply
- to implement solutions that have a high likelihood of success and that provide substantial value for target resources and the ecosystems upon which they depend
- to coordinate with and support other compatible rehabilitation activities to help realize the full measure of benefits offered by aquatic resource conservation efforts in the Lake Washington Watershed
- to design and implement measures that satisfy any mitigation obligations the Applicant may have for the fish migration blockage created by the Landsburg Diversion Dam, as defined by State and Federal law, such as Washington State Senate Bill No. 5156, which establishes a mitigation goal for sockeye salmon in response to the migration barrier created by the Landsburg Diversion Dam (see Section 3.4 for more information).

The Proposed HCP Alternative for the Anadromous Fish Mitigation component of the HCP can be broken down into two main sections: interim and long-term measures for chinook, coho, and steelhead, and interim and long-term mitigation measures for sockeye salmon. The first section covers the mitigation measures, including upstream passage facilities, that will be provided to chinook salmon, coho salmon, and steelhead trout. These measures are the same for all of the other reasonable alternatives evaluated in detail. The second section focuses on the mitigation proposal for sockeye salmon, which cannot be passed over the Landsburg Diversion Dam due to the water quality and public health concerns that would result from thousands of decaying salmon carcasses upstream of the City's drinking water intake. The main feature of the mitigation proposal for sockeye is a full-scale hatchery operation capable of producing up to 34 million fry per year.

Mitigation measures for chinook salmon, coho salmon, and steelhead trout are the same for all reasonable alternatives. This mitigation includes interim measures that will be conducted while fish passage facilities for the three species are being constructed. Long-term fish passage facilities for the safe upstream and downstream passage of migrating salmonids at the Landsburg Dam would include (1) a fish ladder at the Landsburg Dam, (2) a fish ladder and assorted holding and sorting facilities at the partial migration barrier created by the City's water supply pipeline crossing the river approximately one-third of a mile downstream from the Landsburg Dam, (3) downstream fish passage facilities at the Landsburg Dam, and (4) new screening facilities on the municipal water supply intake to prevent entrainment or damage to juvenile fish.

Interim and long-term measures for chinook, coho, and steelhead; mitigation measures for sockeye salmon; and habitat restoration and protection measures are summarized in the following sections.

### **Interim measures for chinook, coho, and steelhead**

With Lake Washington chinook and coho salmon populations in decline and steelhead trout just beginning to show perhaps the first tentative signs of recovery after dropping to record low levels in the early 1990s, rehabilitation efforts would start immediately. Toward that end, the Applicant would begin to provide funds for interim mitigation measures in HCP year 1, immediately after the plan is approved.

Beginning in HCP year 1 and continuing until HCP year 6, until completion of fish passage facilities, the Applicant would implement interim restoration measures for steelhead, coho, and chinook based on the following primary objectives to (1) gather needed demographic, life history, and genetic information that is critical in designing effective and biologically sound short- and long-term conservation measures; and (2) design and, if appropriate, implement a broodstock augmentation program to help preserve the populations. The Applicant will commit up to \$90,000 per year (\$30,000 per species) for as many as 6 years to implement either one or a combination of the following two interim mitigation measures:

- Conduct studies of life history, genetics, and/or demographics of the populations to support the development of the most appropriate measures to protect and rehabilitate the runs over the long term.
- If appropriate, develop and implement an emergency artificial propagation program to help preserve one or more of the runs and prevent extinction and/or loss of genetic diversity and adaptive capacity associated with extremely small population size.

### **Long-term measures for chinook, coho, and steelhead**

Long-term measures for chinook, coho, and steelhead would include upstream fish passage, downstream fish passage, fish screening facilities, fish passage facility operations and maintenance, water quality monitoring, and fish passage facility monitoring. These measures are described in the following sections.

#### ***Upstream fish passage***

The Applicant would provide up to \$965,000 for the design, permitting, and construction of a fish ladder at the Landsburg Dam. The Applicant would also provide up to \$1,046,000 for the design, permitting, and construction of an adult fish ladder and assorted fish holding/sorting facilities at the pipeline crossing barrier below the Landsburg Dam. The barrier is created by the SPU water supply line river crossing at the Landsburg Park, located approximately 1/3-mile downstream of the Landsburg Diversion Dam.

#### ***Downstream fish passage***

With the current configuration at the Landsburg Diversion Dam, downstream migrating juvenile and adult fish would have to pass over the radial spill gates on the dam and could be injured as they struck suspended spill gate supports and the concrete apron below. To minimize this risk, an alternative downstream passage route would be provided. The Applicant would provide up to \$958,000 for the design, permitting, and construction of downstream fish passage facilities at the Landsburg Dam.

#### ***Fish screening facilities***

The current screening facility at the municipal water supply intake on the Cedar River at the Landsburg Diversion Dam does not meet Federal and State fish protection standards and may pose a risk of mortality for under-yearling fish. To eliminate this risk, the Applicant would provide up to \$2,859,000 for the design, permitting, and construction of fish screening facilities at the Landsburg Dam. To avoid potential adverse impacts on drinking water quality and potential violations of regulations caused by construction and operation of fish screening facilities, fish screening facilities would be constructed shortly after the planned ozone water treatment plant becomes operational as scheduled in 2004. Facility design and permitting would be conducted in HCP years 1 through 3. Facility construction would commence when the ozone plant planned for Cedar River water treatment becomes operational, and the raw water compliance point is moved to Lake Youngs, expected in 2004.

#### ***Fish passage facility operations and maintenance***

Once fish passage facilities are constructed, the Applicant would provide up to \$50,000 per year for passage facility operation and maintenance.

### ***Water quality monitoring***

Prior to and after adult coho and chinook are passed above the Landsburg Dam, the Applicant would provide up to \$10,000 per year for up to 6 years to implement a water quality sampling program to monitor the effects of spawning carcasses on drinking water quality. Pending the results of this monitoring program, the total biomass of adult salmon allowed to pass over the dam could be adjusted either upward or downward from the original target of 46,500 pounds of adult chinook and coho salmon (the approximate equivalent of 1,000 chinook and 4,500 coho salmon).

### ***Fish passage facility monitoring***

The Applicant would provide up to \$110,000 during the first 12 years after completion of upstream fish passage facilities to monitor adult fish passage and to better understand run timing, the rate of passage, and the rate at which the populations recolonize previously blocked habitat. Once fish screening facilities are constructed, the Applicant would provide up to \$15,000 to perform hydraulic analyses and to refine flow characteristics of the screens to demonstrate conformity with hydraulic parameters of the facility established for protection of juvenile salmonids.

### **Mitigation Proposal for Sockeye Salmon**

The mitigation program for sockeye salmon under the Proposed HCP Alternative has four primary elements:

- 1) continuation of the existing Landsburg interim sockeye hatchery program until HCP 4
- 2) by September 1 of HCP year 5, implementation of a long-term artificial propagation program that would satisfy the intent of State legislation and help ensure that relatively large and robust populations of sockeye fry are recruited into Lake Washington each year
- 3) establishment of a research and monitoring program to provide the scientific foundation needed for adaptively managing the mitigation program to minimize risk and help ensure that a diverse, well-adapted sockeye population remains an integral component of the aquatic ecosystem in the future
- 4) protection/restoration of sockeye spawning habitat in the lower 21.8 miles of the Cedar River, downstream of the Applicant's ownership boundary.

The Applicant estimates that planning, design, and permitting and construction activities for proposed facilities will require approximately 4-5 years to complete. Returns of Cedar River sockeye salmon have exhibited a declining trend during the last 10 years, with the lowest return on recent record in 1995. The Applicant proposes to continue interim measures prior to completion of long-term mitigation facilities in an effort to slow the rate of decline in the population and to gather additional information that will be useful in managing

the long-term mitigation program. These interim measures include extending funding for the Landsburg Interim Sockeye Hatchery and evaluating fry-rearing efforts. These measures are described in the following paragraphs.

#### ***Extending funding for the Landsburg Interim Sockeye Hatchery***

Under a current agreement with the Washington Department of Fish and Wildlife (WDFW) (Appendix 2), the Applicant is currently participating in the emergency recovery effort by funding the operation of the Landsburg interim hatchery with a capacity to produce up to 16 million sockeye fry per year.

Under this measure, funding for the interim facility would be extended for an additional 4 years and would provide more funds to integrate its operation into a long-term monitoring and research program. Beginning no later than HCP year 1, and continuing through HCP year 4 or until the proposed new hatchery is completed, the Applicant would provide up to \$256,000 per year to cover costs of producing up to 16 million fry at the interim sockeye hatchery.

#### ***Long-term mitigation measures***

The primary objective of proposed long-term mitigation measures is to implement an effective, comprehensive, and biologically sound artificial propagation program that could, if appropriate, produce up to 34 million sockeye fry annually. It is intended that these fry be comparable in quality to fry produced naturally. In addition, they are to be produced in a manner that preserves the long-term reproductive fitness and genetic diversity of the Cedar River sockeye population, while minimizing genetic, ecological, and demographic risks to other naturally reproducing salmonid populations in the Lake Washington Basin. These long-term measures include an artificial propagation facility, program guidelines, a monitoring and research program, program oversight, adaptive management, and provisions for alternative mitigation. These are described in the following paragraphs.

#### ***Evaluating fry-rearing efforts***

The Applicant would provide up to \$65,000 during HCP years 1 through 4 to evaluate the effects of short-term rearing on the freshwater survival of fry released from the interim hatchery. Results from the interim hatchery suggest that the artificially produced fry tend to emerge and outmigrate to Lake Washington slightly earlier than naturally produced fry. It has been suggested that by rearing artificially produced sockeye fry for 2 to 3 weeks before release, operators will more closely simulate the natural condition and timing of naturally produced fry emerging from the Cedar River. It is hypothesized that these fed fry will perform and behave in a manner more similar to naturally produced fry. It is thought that their time of lake entry will more closely coincide with that of naturally reproduced fry and with the spring zooplankton blooms.

#### **Artificial propagation facility**

This alternative provides for the construction of a long-term hatchery with the capacity to produce up to 34 million sockeye fry per year, if appropriate. The program would employ recently developed sockeye culture techniques to help ensure the production of robust, disease-free fish (McDaniel et al., 1994).

The Applicant would provide up to \$7,678,000 during HCP years 1 through 4 for planning, design, permitting, and construction of a sockeye salmon hatchery. Beginning in HCP year 5, the Applicant would provide up to \$300,000 per year to fund facility operations.

#### **Program guidelines**

The number of fry released from the long-term hatchery facility would represent a significant portion of the total sockeye fry produced in the Lake Washington Watershed. Prior to final design, construction, and operation of the facility, program guidelines would be developed to maximize the chances for long-term success and minimize potential negative impacts on naturally spawning sockeye in the Cedar River and elsewhere in the basin. The Applicant would provide up to \$32,000 total in HCP years 1 and 2 for the development of specific guidelines to support design and management of the long-term sockeye fry production program to help ensure the long-term success of the program and minimize genetic and ecological risk. The Applicant recognizes that an adaptive management approach is critical to successful operation of the hatchery, and has established a comprehensive monitoring and research program to evaluate hatchery operations.

#### **Monitoring and research program**

The proposed fry production program carries some inherent risks to sockeye populations in the Cedar River and elsewhere in the Lake Washington Basin. The program will make every effort to avoid or minimize detrimental impacts to the reproductive fitness and genetic diversity of naturally reproducing sockeye salmon populations in the Cedar River and Bear Creek subbasins. However, the Applicant recognizes that adaptive management will be required, that circumstances may occur that could cause fisheries managers to modify hatchery production goals, and that circumstances may occur that could result in an inability to achieve those production goals.

Beginning in HCP year 1, the Applicant would begin funding a \$3,473,000 sockeye research and monitoring program extending over the 50-year life of the proposed HCP to help ensure the success of the mitigation program and to reduce the risk of deleterious effects on naturally reproduced sockeye salmon (see Section 4.3.3).

#### **Program oversight, adaptive management, and provisions for alternative mitigation**

The interim and long-term mitigation and monitoring programs would be overseen by the Parties to the Landsburg Mitigation Agreement (HCP

Technical Appendix 28; Parties include the City, NMFS, FWS, and WDFW) in consultation with the Cedar River Anadromous Fish Committee (CRAFC). The Committee will comprise the Parties, King County, the Muckleshoot Indian Tribe, and other stakeholders. The Parties would approve annual operating and monitoring plans and would review annual operating and monitoring reports. By the time the hatchery would come on line, 10 years worth of data from fry otolith markings (from operation of the interim hatchery) and adult recaptures will be available for review.

If, based upon the results of the monitoring and research program and adaptive management approaches, the sockeye hatchery (or other planned mitigation) is deemed by the Parties to the Landsburg Mitigation Agreement (LMA) to be no longer appropriate during the term of the proposed HCP, either before or after its construction, or, if for reasons beyond its control, the Applicant is unable to complete the permanent sockeye hatchery, then the Applicant would commit remaining funds, at a level not to exceed the total of its original commitments, to alternative mitigation as agreed upon by all Parties to the LMA. If the Parties cannot agree to alternative mitigation, the Applicant will use the funds for fish habitat acquisition, restoration, or enhancement, within the Lake Washington Basin.

In addition, production from the long-term hatchery will be increased gradually, in conjunction with monitoring, to provide the Parties and the Committee the ability to better understand the potential benefits and impacts of greater production. If the objectives of the hatchery are not being met, its operation can be changed adaptively to meet the objectives, or alternative mitigation can be pursued.

#### **Habitat Restoration and Protection Measures**

Another component of Anadromous Fish Mitigation is habitat restoration and protection downstream of the Landsburg Diversion Dam. Protection and restoration of naturally spawning sockeye salmon and their habitat is vital to successful long-term production of sockeye salmon in the Lake Washington Basin. Under this Proposed Action, the Applicant would commit \$1,637,000 to go towards habitat protection and restoration downstream of the Landsburg Diversion Dam. The most likely projects that would be funded include the construction of groundwater-fed side channels in the floodplain of the lower Cedar River as identified in King County's Department of Natural Resources *Cedar River Basin and Non-Point Pollution Action Plan* (King County, 1996). Enhancement of the Walsh Lake Diversion Ditch would also be eligible for consideration. These types of projects can not only provide sockeye spawning habitat that is protected from flood scour but also provide rearing habitat, flood refuge, and water quality benefits for other fish species as well. In addition, the projects can be designed to help restore natural stream structure and function. Decisions regarding project funding will be made by the Parties to

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the LMA. The Parties could choose projects proposed by King County or select other types of projects, such as riparian habitat acquisition.

### **Down-sized sockeye hatchery with savings going towards downstream habitat restoration (AFM-3)**

Under this alternative, a smaller scale sockeye hatchery would be constructed than is included in the Proposed HCP Alternative. This hatchery would be designed with a capacity to produce approximately 17 million fry annually, which is approximately one-half of the production capacity of the full-scale facility. A savings of approximately \$3.6 million would be realized from construction and operation of this smaller hatchery over the 50-year life of the HCP (Montgomery Watson, 1997; Appendix 25). This savings of \$3.6 million would be added to the funds already allocated under the Proposed HCP Alternative, resulting in a total funding of more than \$5.2 million for habitat restoration and protection. All other elements of this alternative are the same as the Proposed HCP Alternative. Variations covered by this alternative are discussed at the end of this section.

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An important factor to consider regarding this alternative is that a reduction in the capacity of the hatchery does not directly lead to a proportional reduction in the costs needed to construct and run the facility. It is estimated that \$22.5 million would be needed to properly construct, operate, and monitor a full-scale facility with the capacity to produce 34 million fry per year. Estimates for a hatchery with one-half the production come to approximately \$18.9 million for 50 years.

Variations within this alternative could include any reduction in hatchery production as long as the savings realized from this decrease go towards downstream habitat restoration and protection. One of the stated planning objectives for the City of Seattle is to satisfy any obligations the state believes the City has concerning the Landsburg blockage. WDFW is currently requiring that an acceptable sockeye mitigation proposal must be capable of producing up to 34 million fry, equivalent to what could potentially be produced from available habitat upstream of Landsburg. (See Appendix 4 and Montgomery Watson, 1990, for information on how this production number was derived.) In order to meet the stated planning objectives, approximately 17 million sockeye fry would need to be produced from the \$5.2 million available for downstream habitat restoration projects as part of this alternative. The alternatives analysis in Chapter 4 of the EA/EIS will examine the potential production of sockeye fry from different habitat restoration projects, such as those detailed in the 1998 King County Cedar River Basin and Non-Point Pollution Action Plan.



### **Deferred hatchery construction contingent on evaluation of more information (AFM-4)**

This alternative would defer construction of the full-scale hatchery for 12 years, until more information can be collected about fisheries in the Lake Washington Basin and the effectiveness of current artificial supplementation efforts. During this time, the interim hatchery would continue to operate at a cost of \$256,000 per year, producing up to 16 million sockeye fry annually. It is estimated that an additional \$1.8 million dollars would also be needed to improve and upgrade the interim facility, which was not designed to operate over such a long time (Montgomery Watson, 1997: [Appendix 25](#)). Suggested variations to this alternative are discussed at the end of this section.

Research and monitoring activities under this alternative would continue as described for the Proposed HCP Alternative. Information collected during the first 10 years would be used to assess the effectiveness of the interim hatchery in meeting mitigation and conservation goals through artificial supplementation. During the first 3 years of plan implementation, downstream habitat restoration projects would be constructed using the \$1.6 million allocated for this purpose as part of the Proposed HCP Alternative. These projects would also be monitored through year 10 to evaluate their effectiveness and maintenance needs.

At the end of year 10, the Parties to the LMA will use the information provided by the monitoring efforts to make a decision about the construction of the full-scale sockeye hatchery facility. If the Parties determine that the hatchery is still desirable, then construction will begin. If the Parties decide that construction of the hatchery is no longer needed, then remaining funds would be spent on downstream habitat restoration and protection.

Because \$1.8 million would have to be spent upgrading the interim facility, this alternative may suffer from a funding shortfall when the time comes to construct the permanent hatchery facility, which would come on line in year 5 under the Proposed HCP Alternative. The interim facility would cost approximately \$45,000 less per year to operate than the full hatchery. Over 7 years, these savings would amount to \$315,000. If this amount is subtracted from the \$1.8 million needed to upgrade the interim hatchery, a funding shortfall of approximately \$1.5 million could result. In order to stay within the cost caps established for the HCP, the Parties to the LMA would decide where to cut costs if construction of the permanent hatchery was warranted, or funds could be sought from an outside source. Under AFM-4, therefore, the Applicant would still commit to the same level of funding for anadromous fish mitigation as in other alternatives. All other elements of this alternative are the same as the Proposed HCP Alternative.

There are many variations within this alternative. For example, at the end of the first 10 years, the Parties to the LMA could agree on continuation of the interim hatchery at a production level of 16 million sockeye fry per year

instead of construction of the full-scale facility, although protracted operation of a facility designed for short-term use would entail risks or could require significant upgrading costs or reduce those risks. In this scenario, any cost savings, such as reduced construction expenditures, would go towards additional downstream habitat restoration and protection projects.

Another variation that was suggested during the scoping process would be to maintain the interim hatchery, spending approximately half of the funding originally proposed for hatchery construction on downstream habitat projects during the first 10 years of HCP implementation. The interim hatchery would still need some upgrading, and even then would still be subject to a significant possibility of failure. However, this variation would provide an opportunity to fully assess whether or not the downstream projects would satisfy the Applicant's mitigation objectives for sockeye production. If studies and monitoring completed by the end of the first decade were to indicate the hatchery is no longer needed, then remaining funds would go towards additional downstream habitat projects. If, on the other hand, the studies indicated that artificial supplementation was still warranted, then the Applicant would proceed with hatchery construction. Because approximately \$10 million for the hatchery construction would have been previously expended on downstream habitat projects, this funding shortfall would have to be made up somehow. It has been suggested that either WDFW or King County would consider it a worthwhile investment to supply this funding, but neither of these agencies has been asked by the Applicant, nor have they volunteered any funding. As a result, this variation cannot be considered a reasonable alternative at this time. However, if either of these agencies, public interest groups, or any other entity came forward with a funding proposal, then this option could receive more consideration.

Another option would be to construct the full-scale hatchery and spend an equivalent amount of money on downstream habitat restoration. Right now, without financial support from another entity, this proposal would significantly exceed the Applicant's cost cap for the HCP. As a result, successful implementation of this option would depend on cost-sharing from another agency or other outside funding.

### **All downstream habitat restoration and protection alternative (AFM-5)**

Under this alternative, a sockeye hatchery would not be constructed. Instead, the level of funding allocated for the hatchery as part of the Proposed HCP Alternative would go towards the construction, maintenance, and monitoring of downstream habitat restoration and protection projects. Although the Parties to the Landsburg Mitigation Agreement would decide which projects to implement, it is assumed for this analysis that priority would be given to the valley floor projects described for King County's Cedar River Basin and Non-Point Pollution Action Plan (King County, 1996). These projects would

include the creation of groundwater-fed side channels, as discussed earlier. Total funding for habitat under this alternative would total approximately \$24.1 million. All other elements of this alternative are the same as those for the Proposed HCP Alternative.

**Table 2-2. Comparison of alternatives for anadromous fish mitigation**

Features	AFM-1 No action	AFM-2 HCP Alternative	AFM-3 Down-sized hatchery	AFM-4 Delayed hatchery construction	AFM-5 All habitat
Interim measures for chinook, coho, and steelhead	No	Yes	Yes	Yes	Yes
Upstream passage facilities for chinook, coho and steelhead	No	Yes	Yes	Yes	Yes
Downstream passage facilities for chinook, coho and steelhead	No	Yes	Yes	Yes	Yes
Fish screening of water supply intakes	No	Yes	Yes	Yes	Yes
Water quality monitoring of fish passage impacts	No	Yes	Yes	Yes	Yes
Continuation of interim sockeye hatchery	Yes*	Yes For 4 years	Yes For 4 years	Yes For 12 years	No
Construction of permanent full scale sockeye facility	No	Yes Production capacity of 34 million fry	Yes Production capacity of 17 million fry	Maybe Depending on study results	No
Extensive monitoring of hatchery impacts	No	Yes	Yes	Yes	Yes
Funding for downstream habitat projects	0	\$1.6 million	\$5.2 million	Possible range from \$1.6-19.3 million	\$24.1 million

\*Continued funding for the interim hatchery past 2003 is uncertain. However, for the purpose of providing a basis for comparing alternatives, it is assumed that funding is continued under the No Action Alternative.

## Anadromous Fish Mitigation Alternatives considered but eliminated from detailed analysis

Many suggestions for mitigating for the Landsburg blockage have been proposed during the past 4 years as part of the interagency negotiations, public outreach efforts, and the formal scoping process. Eight suggestions that have been eliminated from detailed analysis are discussed below. To be considered reasonable, alternatives must be consistent with the Applicant's planning objectives stated for the proposed HCP, and consistent with the purpose and needs of the lead agencies as presented in Chapter 1 of this EA/FEIS. As a result, any alternative that would threaten the quality of the region's drinking

water from the Cedar River or reduce its water supply capacity would not meet the criteria for being reasonable.

**1) Provide passage for all fish including sockeye salmon above the Landsburg Diversion Dam**—Drinking water regulators are concerned about the impacts of large numbers of salmon carcasses on drinking water quality. A recent risk analysis demonstrated that a combined return of approximately 5,500 coho and chinook salmon to the habitat upstream of Landsburg was unlikely to pose a significant risk to public health. However, even at this relatively low number, the impact of salmon carcasses would have to be closely monitored to ensure that the drinking supply remains adequately protected. Assuming runs of coho and chinook come back in larger numbers than currently found in the Cedar River, the proposed HCP allows for up to 46,500 pounds of salmon to pass Landsburg. The additional passage of 262,000 sockeye, or a substantial portion of that number, would pose unacceptable risks to public health, as this number of sockeye would be the equivalent of over 1 million pounds of carcasses (CH2M HILL, 1996; for more information see Technical Appendix 5). In recognition of this substantial risk and in consideration of the Applicant's central mission to protect public health, an alternative strategy has been proposed to mitigate for the lost sockeye salmon production capacity upstream of the Landsburg Dam (see Chapter 3 of this EA/FEIS for more detail). Because of the potential threat to water quality, this alternative is eliminated from detailed analysis because it conflicts with the Applicant's planning objectives for the proposed HCP.

**2) In addition to chinook salmon, coho salmon, and steelhead trout, allow passage for a limited number of sockeye salmon**—Because of the water quality concerns discussed above (for more detail see Chapter 3 of this EA/FEIS), the Applicant has taken a conservative approach to fish passage. The Proposed HCP Alternative could allow the passage of limited numbers of sockeye above Landsburg only after monitoring results prove that the passage of chinook, coho, and steelhead do not pose any problems and that the river could assimilate more carcasses without risking water quality.

The proposed HCP would allow a maximum biomass of 46,500 pounds of fish above Landsburg. Consideration by the Applicant could be given to passing some sockeye salmon depending on the returns of coho and chinook. An average sockeye salmon weighs approximately 5 pounds, which means that, even under the worst of conditions for coho and chinook, no more than 9,300 sockeye salmon could be passed. In addition, passing the more numerous sockeye over the diversion dam within a biomass cap could result in a reduction in the number of the far less numerous chinook or coho allowed to pass, impacting these species while providing only marginal benefit for sockeye.

**3) Expand the Issaquah hatchery instead of constructing a new one at Landsburg**—One of the features of the proposed sockeye hatchery is to control potential environmental impacts of artificial supplementation on other

fisheries in the Lake Washington Basin. Under this alternative proposal, Cedar River sockeye fry would be produced at the Issaquah hatchery and released into Issaquah Creek and enter Lake Washington by way of the Sammamish River. Utilization of the Issaquah hatchery would require an in depth analysis before this facility could be utilized to produce Cedar River sockeye salmon. cursory investigations indicate that the facility does not have the current capacity to meet the demands for coho and chinook salmon, and that safe operation for sockeye could be difficult. Modifying the facility for sockeye would require a major overhaul. Significant issues that would have to be addressed include (1) finding a reliable source of high-quality disease-free water for the hatchery operation; (2) keeping the facility free from Infectious Hematopoietic Necrosis (IHN) virus and other diseases; (3) ensuring that hatching sockeye fry at Issaquah does not interfere with the species' homing ability in the Cedar River or significantly increase the risk of straying fish into Bear Creek, potentially impacting the Bear Creek sockeye population (considered by NMFS as potentially a natural population, thus qualified for listing under the Endangered Species Act); and (4) retrofitting the facility for sockeye culture. For these reasons, use of the Issaquah hatchery has not been pursued.

**4) Either remove the Landsburg Diversion Dam or move the City's water withdrawal intake above Cedar Falls, the natural barrier to anadromous fish passage**—The Landsburg Diversion Dam is required to create the impoundment necessary for the City's intake for the drinking water supply. In addition, the drainage area below Cedar Falls provides a significant percentage of the water that flows in the mainstem by the time the river passes at Landsburg. Implementation of either of these ideas (removing or moving the dam) would greatly exceed the cost caps established for the HCP and significantly reduce the City's average annual firm yield of water from the Cedar River. As a result, these ideas would not satisfy the Applicant's planning objectives for the HCP.

**5) Utilize egg boxes to meet the sockeye mitigation goal**—Egg boxes have been used as a successful tool to supplement the production of several species of salmon throughout Puget Sound. However, this approach would not be effective for sockeye salmon in the Cedar because there are no feasible sites that could meet sockeye culture protocols for (1) isolation; (2) disinfection; and (3) continuous access to a disease-free water source. For these reasons, use of egg boxes has not been pursued.

**6) Build the sockeye spawning channel as originally recommended by state law**—Washington State Senate Bill 5156, passed in 1989 (and codified into the Revised Code of Washington [R.C.W. 75.52]), recommended the construction and operation of a sockeye spawning channel mitigation for the Landsburg blockage. Since that time, however, the WDFW, through the Cedar River Sockeye Technical and Policy committees, determined in 1995 that a hatchery facility posed less risks in running a successful program than the

spawning channel. The committee found that hatchery operation, if run correctly, would have less potential impacts on naturally reproducing fish and incubated eggs by being able to control IHN virus and other diseases. While many suitable sites for the hatchery operation are available, few options exist for the spawning channel, and most sites are on the river's floodplain. A hatchery facility would also be easier to operate and maintain than the channel (WDFW, 1995).

7) **Long-term artificial supplementation for chinook salmon, coho salmon, and steelhead trout**—Providing access to natural habitat is always preferred over artificial supplementation, because there are less potential environmental consequences. This approach is consistent with the recently adopted Wild Salmonid Policy for Washington State. Fortunately, passage facilities for chinook, coho, and steelhead can be installed at Landsburg to provide passage without causing unacceptable public health risks to the region's drinking water supply.

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8) **Artificially produce more sockeye salmon than is required by the mitigation goal for the Landsburg Diversion Dam**—A mitigation goal of 34 million fry has been established by the WDFW for the Landsburg blockage. Establishment of this goal has been based on the number of sockeye salmon which could feasibly be produced from the available spawning habitat located between Landsburg and lower Cedar Falls, a natural barrier to fish migration further upstream (WDFW, 1997). Production of more fry than could naturally be produced by this habitat would not produce a corresponding increase in the number of returning adult salmon, and it could have unintended impacts to the ecosystem of the Lake Washington Basin.

### **Range of Anadromous Fish Mitigation Alternatives Considered for Decision Making Purposes**

A comparison of the main features of the five alternatives for the Anadromous Fish Mitigation component is shown in Table 2-2. In general, these alternatives describe boundaries between artificial supplementation options for sockeye salmon and the potential for implementing habitat protection and restoration projects downstream of Landsburg, and possibly within the Walsh Lake Ditch system. The main factors driving acceptable combinations of these approaches are the cost for the proposed HCP and the mitigation goal to produce the equivalent of 34 million sockeye fry per year. The alternatives considered for Anadromous Fish Mitigation provide possible examples within these boundaries. The Proposed HCP Alternative (AFM-2) would result in the construction of the full-scale hatchery, while AFM-5 would be an all-habitat restoration and protection alternative without any artificial supplementation for sockeye. Except for the No Action Alternative, all of the other alternatives have the same mitigation measures for chinook, coho, and steelhead.

## **Potential Environmental Consequences of Anadromous Fish Mitigation Alternatives**

The main environmental consequences of these alternatives involve potential impacts to the fisheries resources of the Lake Washington Basin. These impacts are analyzed in Chapter 4 of this EA/EIS.

### **2.3.3 Instream Flow Alternatives (IF)**

#### **Description of Alternatives Evaluated in Detail**

Instream Flow (IF) Alternatives consider different approaches to managing flows on the Cedar River downstream of the City's Masonry Dam in a way that is consistent with the objectives related to the Endangered Species Act and the City's public utility functions and constraints presented in Section 1.2.

Only the No Action Alternative and the Proposed HCP Alternative are fully evaluated for this EA/EIS. No other reasonable alternatives have been developed or proposed for this component of the HCP. Other alternatives considered but rejected from further analysis are also explained in this section. This section includes a discussion of the range of Instream Flow Alternatives that will be considered in the decision-making process. This discussion concludes with a comparison of the No Action and Proposed HCP Alternative and a summary of their environmental consequences.

#### **No Action Alternative (IF-1)**

The No Action Alternative represents what is likely to occur as part of the management of instream flows if the Applicant does not pursue an ITP and does not implement an approved HCP. In general, the No Action Alternative for the Instream Flow component is defined as continuation of current flow management practices. Under this alternative, the Applicant would follow the flow regime set in 1979 for the Cedar River by the Instream Resource Protection Program (IRPP) as general, nonbinding guidelines for managing flows.

Under the No Action Alternative without an ITP, the Applicant would have to address any potential future listing of threatened and endangered fish species on a case-by-case basis. Currently only bull trout and chinook salmon have been proposed for listing. It is assumed that if these or other listings were to occur the Applicant would tailor the management of instream flows as described below to maximize benefits to listed species, possibly constraining the Applicant's water supply operations, and potentially reducing the City's firm yield of the water supply capability.

When the City first began to divert water from the Cedar River in 1901, the state was 16 years away from adopting its first water code. In practice, the general western water law doctrine of prior appropriation was accepted as the system under which priority water rights were established.

In 1972, the State established a process for documenting pre-code water rights. Such users were asked to submit a water claim documenting their views on the total amount and priority dates of their uses.

The City documented its water claim on the Cedar River in 1974, indicating a priority date of 1888 and a right to divert at Landsburg up to 300 million gallons per day for municipal and industrial use. Ecology acknowledges this claim in the river.

In 1979, Ecology established an instream flow regime for the Cedar River as part of the IRPP (WAC 173-508). Since that time, the City has always maintained and documented that its water claim is senior by many decades, and, therefore, superior to the 1979 flow regime. This position has never been disputed by Ecology, since state statute protects existing rights from newly established minimum instream flow requirements. As a result, the flows proposed for the Cedar River by the IRPP have never been legally binding on the Applicant.

Even though the Applicant's claim to the Cedar River predates the authority of Washington State to impose instream flow requirements, the City's Water Supply Plan expressed the City's intent to gradually phase in the IRPP flows through a non-binding approach by 2003. This nonbinding flow regime, as outlined below, was developed 20 years ago from recommendations from the U.S. Army Corps of Engineers (ACOE), Washington State Department of Ecology (WDOE), the Washington State Department of Fisheries (WDF), and the Fisheries Resource Institute (FRI). Instream flow incremental methodologies (IFIM), and other technical investigations typically used today for determining instream flow needs were not available when the IRPP flows were established. For the first time, the concept of a "critical" minimum instream flow regime was introduced for the Cedar River. This concept involves establishing a lower instream flow standard for use in very dry years, as opposed to having the same set of flows apply every year regardless of climate conditions.

Under a normal flow year as measured at the existing United States Geological Survey (USGS) gauging station No. 12.1190.00, Cedar River at Renton, the Applicant would use the flows below as nonbinding guidelines by 2003 as part of the No Action Alternative:

- 370 cfs from October 10 to June 20
- a linear decrease in flows from 370 cfs on June 20 to 130 cfs on July 15
- 130 cfs from July 15 to September 10
- a linear increase from 130 cfs to 200 cfs from September 10 to September 20
- 200 cfs from September 20 to October 1
- a linear increase from 200 cfs to 370 from October 1 to October 10.



If natural Cedar River flows fall below the flows expected to occur no more than 1 year out of 10 on average, then critical flows may be provided:

- 250 cfs from November 1 to June 15
- a linear decrease from 250 cfs to 110 cfs from June 15 to July 1
- 110 cfs from July 1 to October 1
- a linear increase from 110 cfs to 250 cfs from October 1 to November 1.

### **Proposed HCP Alternative for Instream Flows (IF-2)**

The Proposed HCP Alternative for Instream Flows is presented in detail in Chapter 4 of the *Draft Cedar River Watershed Habitat Conservation Plan* (City of Seattle, 1998). This section discusses the most relevant features that differentiate the Proposed HCP Alternative from the No Action Alternative. These features include (1) the proposed binding flow regime, (2) establishment of a multiagency flow commission, (3) a study to evaluate the Cedar Permanent Dead Storage Project, (4) funding for water conservation and improved fish passage at Ballard Locks, (5) minimum flow commitments for the bypass reach between the Masonry Dam and the Cedar Falls hydroelectric facility, (6) down ramping rates, and (7) supplemental flows for steelhead and the flexibility to recover the water by the use of temporary pumps or by reducing instream flows.

The flow regime outlined as part of this Proposed HCP Alternative is intended to establish greater long-term certainty for fish habitat both above and below the Landsburg Diversion Dam. Under this proposal, the Applicant would commit to a binding set of minimum instream flow requirements to replace the current nonbinding flow targets. In addition, recognizing that water in the Cedar River system exceeds the volumes needed to meet minimum instream flows and water supply needs in most years, the Applicant would also supplement the required minimum flows to meet biological objectives under specific conditions that reflect actual and forecasted water availability conditions. This process involves managing and sharing risks for both stream flows and water supply.

Minimum instream flows represent *requirements* of the Applicant in this proposal and are referred to as “firm” flows or other quantities. Additional flows provided to supplement minimum flows under specified conditions and procedures represent *goals* of the Applicant and are referred to as “non-firm” flows or other quantities. For both requirements and goals, the Applicant’s commitments would be the *occurrence* of the specific flows under the conditions stated and not to a particular method of water management that causes flows to occur. At times, the Applicant would have to release water from storage to meet its requirements or goals downstream; at other times other flow management actions or natural hydrologic events may provide the necessary flows.

Under the Proposed HCP Alternative, the Applicant would provide at least the minimum instream flows as shown in Table 2-3 and measured at the existing USGS gage located downstream of the Landsburg Diversion Dam. In addition to the baseline minimum flow commitments, this flow regime provides the following features that provide higher flows under specified conditions to meet stated habitat objectives:

- higher than normal minimum flows in late winter and early spring for sockeye outmigration between February 4th and May 12th
- a firm block of 2,500 acre feet of water to supplement normal minimum flows in early summer for the protection of steelhead redds
- higher than normal flows in September for sockeye and chinook spawning
- an additional “non-firm” block of 3,500 acre-feet of water to supplement normal minimum flows in early summer when available for the protection of steelhead redds
- two-part normal flow regime between October 8th and December 31st for sockeye and chinook spawning.

As part of the Proposed HCP Alternative, the measuring point for meeting these instream flows would be moved from the USGS gage at Renton to the USGS gage at River Mile 20.4 located just below the Landsburg Diversion Dam. This move would align the Applicant’s accountability with its direct impact on the river.

Consistent with the planning objectives established for the HCP, the proposed flows would allow the Applicant to maintain its water supply yield from the river, and would preserve the operational flexibility necessary for water supply operations. Modeled analyses indicate that the City’s total water system average annual firm yield (for year 2000) of 171 million gallons of water per day (mgd) (or 97 mgd for the Cedar River source only) could be maintained with these flows.

Other features of the Proposed HCP Alternative include the following:

- establishment of a multiagency commission to oversee flows for fish and assist in making decisions about how to allocate available non-firm blocks of water

**Table 2-3. Minimum normal, minimum critical and supplemental instream flow commitments included in the Proposed HCP Alternative**  
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MINIMUM AND SUPPLEMENTAL FLOWS MEASURED AT LANDSBURG				
Calendar week	Normal minimum (cfs)	Normal with supplement (cfs)	Critical minimum (cfs)	Critical with supplement (cfs)
Sep 23 - Sep 30	95	210 <sup>2/</sup>	80	
Oct 1 - Oct 7	210		100	
Oct 8 - Oct 14	330/275 <sup>1/</sup>		130	
Oct 15 - Oct 21	330/275 <sup>1/</sup>		160	
Oct 22 - Oct 28	330/275 <sup>1/</sup>		180	
Oct 29 - Nov 4	330/275 <sup>1/</sup>		200	
Nov 5 - Nov 11	330/275 <sup>1/</sup>		200	
Nov 1 - Nov 18	330/275 <sup>1/</sup>		200	
Nov 19 - Nov 25	330/275 <sup>1/</sup>		200	
Nov 26 - Dec 2	330/275 <sup>1/</sup>		200	
Dec 3 - Dec 9	330/275 <sup>1/</sup>		200	
Dec 10 - Dec 16	330/275 <sup>1/</sup>		200	
Dec 17 - Dec 23	330/275 <sup>1/</sup>		200	
Dec 24 - Dec 30	330/275 <sup>1/</sup>		200	
Dec 31 - Jan 6	260		180	
Jan 7 - Jan 13	260		180	
Jan 14 - Jan 20	260		180	
Jan 21 - Jan 27	260		180	
Jan 28 - Feb 3	260		180	
Feb 4 - Feb 10	260		180	
Feb 11 - Feb 17	260	365 <sup>3/</sup>	180	
Feb 18 - Feb 24	260	365 <sup>3/</sup>	180	
Feb 25 - Mar 3	260	365 <sup>3/</sup>	180	
Mar 4 - Mar 10	260	365 <sup>3/</sup>	180	
Mar 11 - Mar 17	260	365 <sup>3/</sup>	180	
Mar 18 - Mar 24	260	365 <sup>3/</sup>	180	
Mar 25 - Mar 31	260	365 <sup>3/</sup>	180	
Apr 1 - Apr 7	260	365 <sup>3/</sup>	180	
Apr 8 - Apr 14	260	365 <sup>3/</sup>	180	
Apr 15 - Apr 21	260		180	
Apr 22 - Apr 28	260		190	
Apr 29 - May 5	260		190	
May 6 - May 12	260		195	

**Table 2-3. Minimum normal, minimum critical and supplemental instream flow commitments included in the Proposed HCP Alternative** Page 2 of 2

MINIMUM AND SUPPLEMENTAL FLOWS MEASURED AT LANDSBURG				
Calendar week	Normal minimum (cfs)	Normal with supplement (cfs)	Critical minimum (cfs)	Critical with supplement (cfs)
May 13 - May 19	260		200	
May 20 - May 26	250		210	
May 27 - Jun 2	250		210	
Jun 3 - Jun 9	250		200	
Jun 10 - Jun 16	225		200	
Jun 17 - Jun 23	225	4/	160	
Jun 24 - Jun 30	225	4/	100	
Jul 1 - Jul 7	170	4/	80	
Jul 8 - Jul 14	105	4/	80	
Jul 15 - Jul 21	80	4/	80	
Jul 22 - Jul 28	80	4/	80	
Jul 29 - Aug 4	80	4/	70	
Aug 5 - Aug 11	80		70	
Aug 12 - Aug 18	80		70	
Aug 19 - Aug 25	80		70	
Aug 26 - Sep 1	80		70	
Sep 2 - Sep 8	80		70	80 <sup>5/</sup>
Sep 9 - Sep 15	80		70	80 <sup>5/</sup>
Sep 16 - Sep 22	95	133 <sup>2/</sup>	80	

1/ Values shown represent high and low normal minimum flows weeks 2 to 13.

2/ Total flow during normal years if flashboards in place.

3/ Total flow provided 70% of time in normal years.

4/ Additional 2,500 acre-feet in all normal years 6/17 - 8/4; plus additional 3,500 acre-feet in 70% of normal years 6/17 - 8/4 as directed by Commission.

5/ Total flow during critical years if flashboards in place.

- funding to evaluate the feasibility and environmental impacts of accessing dead storage in the Chester Morse Lake Reservoir on a permanent basis to augment future flows for fisheries resources and water supply
- local matching funds to the Army Corps of Engineers for improved juvenile passage at Ballard Locks and for improvements to the facility or its operation that would increase water available to improve fish passage through the locks

- commitments to provide minimum flows in the bypass reach of the Cedar River below the Masonry Dam to ensure suitable habitat for resident fish and the anadromous fish that pass over the Landsburg Diversion Dam and move upstream of the Cedar Falls powerhouse.
- defined rates for down ramping river flows (or a reduction in instream flows) in order to avoid the stranding of juvenile and adult fish in the river
- additional water to be released for steelhead incubation and the flexibility to recover the water by using the existing temporary pumps to tap the reservoir's dead storage or by reducing instream flows during years of extreme drought
- funding for public service announcements to increase public awareness about the benefits that water conservation can have for fish in the Cedar River during low flow periods
- funding for the "Lower Cedar River Accretion Monitoring Study" to monitor and evaluate local inflows flows between Landsburg and Renton
- continuous monitoring of flows in the mainstream of the Cedar River at numerous locations from Cedar Falls to Renton.

### **Instream Flow Alternatives Considered But Eliminated From Detailed Analysis**

Several suggestions for managing instream flows have been made during the past 4 years as part of interagency negotiations, public outreach efforts, and the formal scoping process. These suggestions and why the alternatives were eliminated from detailed analysis are discussed below. In general, alternatives must be consistent with the Applicant's planning objectives for the proposed HCP. In addition, the alternative must be consistent with the purpose and needs of all three lead agencies to be considered reasonable.

The following suggestions have been eliminated from detailed analysis:

#### **1) Consider water conservation so that higher instream flows can be maintained.**

The City of Seattle already has a very effective water conservation program, and a long-term Water Conservation Strategy (City of Seattle, 1998; Technical Appendix 9). The effect of water conservation is to reduce water diversions, and to delay the need for a new water supply source. The role that conservation programs will play in the future is a regional water supply question that is outside the scope of the HCP. As previously mentioned, however, the Proposed HCP Alternative does provide some funding to increase public awareness about the benefits conservation can have for fisheries resources in the Cedar River during low flow conditions. The effects on future

conservation potential associated with each instream flow alternative are discussed in Section 4.9.4.

**2) Consider the water supply of the entire Puget Sound region and demand forecasts for 20 and 50 years into the future.**

This suggestion is not a defined alternative. The instream flow component of the proposed HCP is a proposal for mitigation to protect and enhance fish habitat. The purpose of the proposed HCP is to ensure compliance with the Endangered Species Act (ESA) by addressing potential impacts to species of concern from City operations in the Cedar River Municipal Watershed. It is not a regional water supply plan. As a separate process, the City is currently involved in long-range regional water supply planning that will consider new sources, conservation, and use of the region's water resources through conjunctive use of different sources. However, the effects of the instream flow alternatives on long-range water supply planning are discussed in Section 4.9.4.

**3) Limit or "cap" City water diversions from the Cedar River.**

Similar to the response to 2), above, the instream flow component of the proposed HCP is a proposal for mitigation to protect and enhance fish habitat. The purpose of the proposed HCP is to provide compliance with the ESA by addressing potential impacts to species of concern from City operations in the Cedar River Municipal Watershed. It is not a regional water supply plan. The City's water claim, the seasonal pattern of water use, and proposed HCP instream flow commitments do put both a practical and legal limit on diversions. Diversion caps could unacceptably constrain the City's need for operational flexibility to handle swings in weather, demand, and water system problems.

**4) Control growth by limiting water availability from the Cedar River.**

See response to item 3 (above).

**5) Commit to higher instream flows than the Proposed HCP Alternative**

Several suggestions have been offered to develop a minimum instream flow regime with flows at certain times of the year that would be higher than those in the proposed HCP. For example, the WDFW and the Muckleshoot Indian Tribe developed several proposals. During development and negotiation of the proposed HCP flow regime, which was a ten-year collaborative effort among the City, federal and state agencies, and the Muckleshoot Indian Tribe, these suggestions were given serious consideration. They were evaluated on the basis of known fish biology, and on their effect on the City's water supply capabilities. It was found that some of the flow proposals would be completely incompatible with water supply operations and others had serious biological impacts on some species and life stages. The agreed upon instream flow

regime represents the highest flows that meet all of the fish mitigation objectives without impairing the City's water supply operations. They are the result of a careful and comprehensive balancing of water supply benefit and risk with fisheries resource benefit.

The following specific proposals for higher minimum instream flows have been offered, and a discussion of their biological basis is included. As noted, the science is not always clear on some aspects of these proposals. *Each of these proposals would result in a loss of water supply capacity as measured by firm yield:*

*Proposal: Higher flows in the fall for more sockeye edge habitat to reduce the risk of redd scour*

*Response:* The flows provided by the proposal are well above the level required to maximize total sockeye spawning habitat. In fact, the flows are so high that the resulting increases in water depth and velocity cause a nearly 50 percent reduction in total available sockeye spawning habitat. There is very little additional edge habitat available in the channel over and above what is already provided by the proposed HCP flows. To obtain even very small additional increases in edge habitat requires a very large expenditure of water and will result in substantial added losses in total spawning habitat for sockeye and chinook. The proposed flows balance the need for sockeye and chinook spawning habitat availability with the hypothesized benefits that result from recruiting small amounts of additional habitat along the edges of the channel.

*Proposal: Higher flows for improved sockeye fry survival during outmigration in the spring*

*Response:* The studies that have highlighted this issue during the last couple of years are not yet complete. The studies have been conducted only on hatchery fish released at the extreme upstream end of the present range of sockeye spawning. The results to date likely overstate the mortality experienced by the majority of young fish as they migrate downstream. Nevertheless, in response to the preliminary findings, the HCP provides guaranteed flows that are well above the existing IRPP flows. The relationship between stream flow and the survival of outmigrating wild fry originating from lower in the system has not been quantified. Therefore, the magnitude of the benefit that will accrue to sockeye fry by augmenting flows even further is quite uncertain.

In addition, the provision of higher flows for outmigrating sockeye fry conflicts with the needs of spawning steelhead in two ways. First, the higher flows result in a substantial reduction in available steelhead spawning habitat. Second, the higher flows will tend to force steelhead to spawn in marginal areas where their eggs may be left high and dry as flows drop to normal base levels during the early summer.

*Proposal: A larger block of water for improved steelhead incubation protection during the summer*

*Response:* Studies conducted during the past four years indicate that in all but the most extreme years, the proposed blocks of water provided by the HCP will ensure nearly 100 percent protection for incubating steelhead. The level of steelhead incubation protection provided by the HCP is well above that provided by the existing IRPP regime and is likely well above the levels that exist in many unregulated streams.

*Proposal: Higher flows for chinook outmigration in the late spring and early summer*

*Response:* “Ocean type” chinook such as those found in the Cedar, do not typically rear in large lakes. Newly emerged fry generally move directly downstream to estuaries or rear in rivers for up to three months before moving downstream. It is not at all clear that encouraging newly emerged chinook fry to move downstream into Lake Washington will be beneficial for their survival.

## **Range of Instream Flow Alternatives Considered for Decision Making Purposes**

A comparison of the No Action Alternative and Proposed HCP Alternative are shown in Table 2-4.

The No Action Alternative would manage flows according to a flow regime recommended in 1979. There are no provisions to adaptively manage flows to meet fisheries needs when water is available. The Proposed HCP Alternative sets minimum instream flows to maximize benefits to several species of anadromous fish. Provisions are included to adaptively manage additional water above these minimum instream flows for anadromous fish when the water is available.

The Proposed HCP Alternative also includes funding for a study to evaluate the feasibility of using dead storage behind the Masonry Dam on a permanent basis (Cedar Permanent Dead Storage Project) as a source of additional water for anadromous fish and drinking water supplies.

Figures 4.4-4, 4.4-5, 4.4-6, and 4.4-7 and Table 4.4-4 compare normal and critical flow regimes that would be followed under the No Action Alternative and the Proposed HCP Alternative. These graphs show expected critical and normal flow conditions on the Cedar River at the Landsburg and Renton gauge locations. The main features of these alternatives for normal flows compared in Table 2-4.

The Proposed HCP Alternative represents the results of lengthy negotiations among the Applicant and State and Federal resource agencies. The flow regime in the Proposed HCP Alternative is based upon extensive technical studies and would be overseen by an interagency committee. The Proposed



HCP Alternative for instream flows is intended to meet multiple objectives for water supply, fisheries, and flood control management.

**Table 2-4. Comparison of the No Action and Proposed HCP Alternatives for instream flows**

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Feature	IF-1 No Action	IF-2 HCP Alternative
Flow regime	Non-binding IRPP flows	Flow regime based on best available scientific information providing improved habitat conditions to fish
Legally binding	No	Yes
Point of compliance for minimum instream flows	USGS gage at Renton	USGS gage at Landsburg below Diversion Dam
Supplemental flows for sockeye outmigration	No	Yes
Adaptive management of flows for protection of steelhead redds in summer	No	Yes
Supplemental flows for sockeye and chinook spawning	No	Yes
Average annual firm yield maintained	Yes	Yes
Yield amount (total system, year 2000)	171 mgd	171 mgd
Multi-agency commission to oversee flows for fish	Yes (informal)	Yes
Funding to evaluate feasibility of dead storage project	No	Yes
Improvements for juvenile fish passage at Ballard Locks	No	Yes
Minimum flows in bypass reach	No	Yes
Established down-ramping rates	No	Yes
Use of temporary pumping facilities or reductions in instream flows to recover water previously released for fish to reduce risk of water supply and fish habitat shortages in fall	No	Yes
Mandated public service announcements promoting water conservation for fish	No	Yes
Lower Cedar River accretion flow monitoring study	No	Yes

## **Potential Environmental Consequences of Instream Flow Alternatives**

Potential environmental impacts from these alternatives are discussed in Chapter 4. Environmental consequences from the alternatives include potential impacts on several elements of the affected environment, including water quality and quantity, fisheries habitat and resources, recreation, and public services. All of these consequences relate to balancing different demands on available water resources from the Cedar River.

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## **2.4 Previous and Future Environmental Analyses Related to this Proposal**

Several environmental review documents for projects or programs which may in some way be related to the proposed HCP have already been prepared or will be prepared in the future. These documents include environmental impact statements for a sockeye spawning channel on the Cedar River (never constructed), for the secondary use objectives adopted by the City Council for management of the Watershed, and for use of the temporary pumping facilities on Chester Morse Lake Reservoir. In addition, the City is planning environmental analyses for various Landsburg facilities and the Cedar River Treatment Facilities. Additional environmental review may also be appropriate for various elements of the HCP proposal as they are implemented over time.

### **2.4.1 Previous Analyses**

Previous environmental analyses related to the HCP proposal include:

#### **Environmental Impact Statement for the Morse Lake Temporary Pumping Plant No. 2 (Seattle Water Department, 1992)**

The purpose of the EIS for the Morse Lake Temporary Pumping Plant No. 2 (Seattle Water Department, 1992) was to evaluate the impacts from the installation and possible operation of an additional floating pumping plant on Chester Morse Lake. The function of the project was to provide enhanced ability to provide emergency water supply during drought conditions to municipal and industrial customers during fall and winter months, while still meeting instream flow needs. Expected benefits of the proposal included increased reliability of the water supply during extended dry fall periods and enhanced flexibility to protect public health and safety and other natural resources threatened by naturally occurring droughts. Potential impacts discussed in the EIS included the incremental amount and rate of lake drawdown under drought conditions.

## **Environmental Impact Statement for the Cedar River Sockeye Project (Seattle Water Department, 1991)**

Options for mitigating the effects of the Landsburg blockage on Cedar River sockeye have been studied for years. In 1989, the Washington State Legislature passed Senate Bill 5156 (amending Chapter 75.52 R.C.W.) calling for the construction of a sockeye spawning channel on the Cedar River. The legislation established an interagency sockeye Technical Committee to plan the design and construction of the project, and a Policy Committee to oversee the project. An EIS was prepared by the City for this project in 1991, but in 1993, the Cedar River Sockeye Policy Committee decided to postpone construction of a proposed sockeye spawning channel and to initiate a 5-year, emergency sockeye recovery effort to reverse the precipitous decline of Lake Washington sockeye salmon populations and to gather the information required to develop and implement an effective long-term sockeye mitigation program. Information gathered during the emergency recovery effort has been used to guide the development of the long-term mitigation program as proposed in the HCP.

## **Environmental Impact Statement for the Cedar River Municipal Watershed Secondary Use Analysis (Seattle Water Department, 1990)**

The purpose of the Environmental Impact Statement for the Cedar River Watershed Secondary Use Analysis was to describe and evaluate different alternatives that were developed for managing uses secondary to the primary use of providing a reliable source of high quality drinking water. This document, which was completed in 1990, also includes an assessment of the potential environmental impacts from the alternatives. Different uses evaluated in the document include timber resources, wildlife and botanical resources, fisheries resources, education, recreation, research and cultural resources.

### **2.4.2 Future Analyses**

Future environmental analyses related to the HCP proposal include:

#### **SEPA Review Related to Landsburg Facilities**

The City anticipates completing a variety of improvements to facilities at Landsburg over the next ten years. Some of the proposed improvements are needed for ongoing operation of existing treatment and supply facilities, such as the planned ozone treatment facility at Lake Youngs. Other upgrades will address the structural stability of the dam and its flood passage capacity. The earliest improvements to occur at the site may be the Anadromous Fish Mitigation measures proposed in the HCP, including fish passage facilities, screening and the proposed sockeye hatchery.

Project specific environmental review and permits will be needed for the Landsburg projects as they are implemented over a multiyear period. Since a programmatic EA/EIS is being prepared pursuant to NEPA and SEPA for the projects included in the proposed HCP, actual project implementation may only need an environmental checklist and Determination of Non-Significance (DNS) with appropriate mitigation to fulfill SEPA requirements. A logical grouping of fish facility projects for coverage under project-specific SEPA documentation could include: (1) all of the facilities at the dam; (2) all of the facilities at the pipeline crossing; and (3) the proposed sockeye hatchery. There may be additional options, depending on how the City decides to combine currently planned treatment upgrades at Lake Youngs with the Landsburg improvements.

All these projects will require state and local permits, and in some cases federal permits. The major new permit requirements would be for those projects requiring in-water construction or significant new development within the riparian zone. The major federal permits would include a Section 10/404 permit from the Army Corps of Engineers. The major state permit would be pursued via the Joint Aquatic Resource Permit Application (JARPA) which consolidates and encompasses the requirements for the Hydraulic Project Approval from WDFW. Local permit requirements could include a Shorelines Substantial Development Permit from King County.

### **Cedar Facilities Draft Environmental Impact Statement (in preparation)**

The purpose of this environmental review is to evaluate the potential impacts from upgrading water treatment facilities for the Cedar system currently located at the Lake Youngs reservation.

### **Project Specific SEPA Review for HCP Implementation**

Specific projects implemented as part of the HCP may require further SEPA analysis at the time of construction, depending upon what permits are required. As indicated earlier, an Hydraulic Project Approval and a Shoreline Substantial Development Permit may be required for fish facilities at the dam, fish facilities at the pipeline crossing, and the proposed hatchery. These permits and associated SEPA review may also be required for instream habitat restoration projects proposed for upstream and downstream of the Landsburg Diversion Dam. In general, it is anticipated that SEPA review would focus on the potential for erosion and sedimentation impacts at the time of construction.

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## 2.5 Effects of Deferring the Proposed Action

Deferring the proposed action would affect management of City operations in the Cedar River Municipal Watershed and have a direct influence on how the Applicant would fulfill Endangered Species Act requirements for these activities.

For watershed management activities, anadromous fish mitigation and instream flows, the effects of deferring implementation of the HCP are illustrated by the No Action Alternatives for these three components of the plan. For example, watershed management without the HCP is expected to result in a more intensive timber harvest program, a smaller Ecological Reserve, and uncertain funding for road decommissioning and habitat restoration programs. Without implementation of the HCP, there would not be a formal timeline for resolving Landsburg mitigation issues. Interim measures for chinook, coho and steelhead would not be implemented. Funding for the interim hatchery operation for sockeye would only be assured through 2002. For instream flows, the Applicant would probably operate according to the nonbinding IRPP flows. In addition to these effects, deferring the proposed action would significantly influence the way the Applicant would meet ESA requirements for operations in the Cedar River Municipal Watershed.

Without an approved multispecies HCP, the Applicant would presumably delay any necessary protection and restoration measures for any species until after individual listings occurred. One of the advantages of doing a multispecies HCP is that protection and restoration measures can be implemented before listings take place. Another consequence of deferring the proposed action would be to expose the City to regulatory uncertainty. With an approved HCP, the City can conduct long term water supply planning activities for the region while having some certainty in regards to how future listings under the ESA may influence its operations.

In addition, if the actions contemplated in the three components of the plan were not pursued as part of the HCP, the physical improvements anticipated by those components would either be delayed or never be implemented. The impacts associated with those facilities would be either deferred or avoided entirely.

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## 2.6 Conclusion

This chapter has provided a description and comparison of features for all of the alternatives considered for the proposed Cedar River Watershed Habitat Conservation Plan.

The alternatives fully evaluated as part of the EA/FEIS for the Watershed Management component include the following:

Deleted: to be

- WM-1 No Action Alternative for Watershed Management;
- WM-2 Proposed HCP Alternative for Watershed Management;
- WM-3 Long-Term Sustainable Thinning Alternative;
- WM-4 Thinning Alternative with Phased Out Commercial Timber Harvest; and
- WM-5 No Commercial timber Harvest Alternative.

The alternatives fully evaluated as part of the EA/FEIS for the anadromous fish mitigation component include the following:

Deleted: to be

- AFM - 1 No Action Alternative for Anadromous Fish Mitigation;
- AFM - 2 Proposed HCP Alternative for Anadromous Fish Mitigation;
- AFM - 3 Down-sized Sockeye Hatchery Alternative with Savings Going Towards Downstream Habitat Restoration;
- AFM - 4 Deferred Hatchery Construction Alternative Contingent on Evaluation of More Information; and
- AFM - 5 All Downstream Habitat restoration and Protection Alternative.

The two alternatives fully evaluated as part of the EA/FEIS for the instream flow component include the following:

Deleted: to be

- IF-1 No Action Alternative for Instream Flows; and
- IF-2 Proposed HCP Alternative for Instream Flows.

The full range of alternatives acceptable for decision making purposes has been discussed for each component. In addition, these discussions have explained why some alternatives suggested for consideration were eliminated from detailed evaluation.

Detailed analyses of the potential impacts from these alternatives is presented in Chapter 4 of this document. The chapter concludes with tables summarizing the main effects of the alternatives for each component of the plan. These summary tables are organized by major issues, such as protection of old growth forests, the likelihood of meeting sockeye mitigation goals, and instream flow effects on rearing habitats for different fish species.

